# Intersubband Dynamics in Semiconductor Quantum Wells, David S. Citrin, Georgia Institute of Technology, DMR-0303969

Intersubband transitions in quantum wells (QW) remain of great interest for far- and mid-infrared applications as well as for the intrinsic interest in the ultrafast dynamics of electronc in these structures. In particular, phenomena in the terahertz (THz) region of the spectrum are of interest since they rely on picosecond and subpicosecond phenomena.

In Ref. [1] we show how the use of a low-qulity factor THz resonator can substantially enhance a particular nontrivial intersubband nonlinearity--namely bistability. Enhancements in nonoptimized resonators are calculated to be in the few-times range.

1. A. Batista and D. S. Citrin, Opt. Lett., in press.

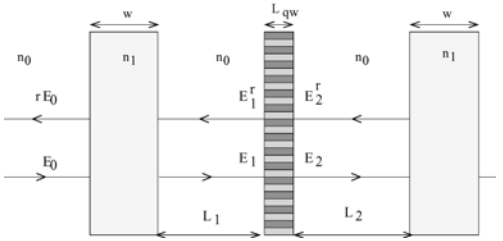


Fig. 1: Diagram of QW stack in simple Fabry-Perot resonator.

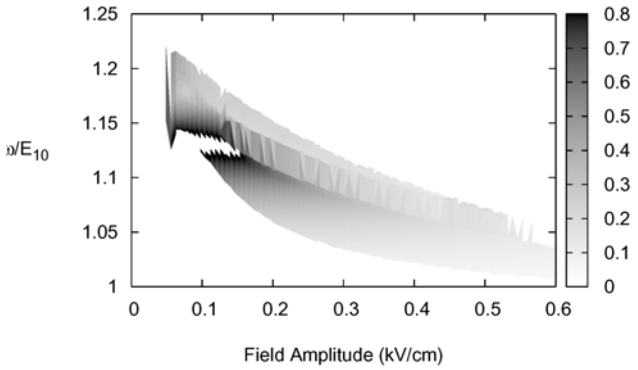


Fig. 2: Enhanced region of bistable THz response of QW stack in Fabry-Perot resonator as shown in Fig. 1.

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**Technological Impact:**

As the THz region of the spectrum is opened to technological exploitation--for spectroscopy, sensing, and imaging--a toolbox similar to what is available in the visible region will be needed. This includes nonlinear elements. Our work under this program seeks to explore physical phenomena in QW's that may lead to the development of future THz devices.